LARGE SCALE SYSTEM
USER REQUIREMENTS

FINAL REPORT
NATIONAL ADVANCED SYSTEMS, INC.

FEBRUARY 9, 1984

INPUT

I. INTRODUCTION

- This report was prepared by INPUT as a custom study for National Advanced Systems (NAS).

A. OBJECTIVES

- The objective of this study is to identify, analyze and evaluate large-scale system user requirements within competitive, geographic and industry structure parameters. I.e.,

    - Existing and potential users' views on the most important or critical large-scale system needs for effective operations.

    - For these most important needs, what the user considers to be the relative importance and minimum level of acceptability of the current and future product offerings.

    - The perceived strengths and weaknesses and degree of importance that current large-scale system users associate with vendors in the plug compatible marketplace.

    - The criteria used by large-scale system users to select vendors and the weighting and importance of each category such as (but not limited to):

        - Price performance.
        - Capacity and power.
        - System architecture/software/hardware.
        - Compatibility/enhancements.
        - Reliability.

    - The requirements for support and service including, but not limited to:

        - Marketing.
        - Technical.

  - Training.
  - Education.

- To deliver research data and findings in a form which facilitates NAS matching existing capabilities to serve the large-scale systems market with user needs and requirements.

B. METHODOLOGY

- A questionnaire was prepared by INPUT and reviewed with NAS at the project kick-off meeting in October 1983. Modifications were made to the questionnaire and accepted by NAS.

  - A copy of the questionnaire is in Appendix A.

- An initial list of interview targets was prepared by NAS branches and forwarded to INPUT. This list was later supplemented by INPUT lists. Targetted respondent characteristics included:

  - A total of 96 interviews, with approximately 8 on-site and the remainder conducted by telephone.

  - Of these interviews approximately 32 would be NAS sites and 64 competitive (i.e., Amdahl and IBM) sites.

  - Approximately 80% of sites would be large scale and the remainder smaller sites. The rationale for including some smaller sites is that:

    - Smaller sites often grow into larger sites.

    - Personnel at smaller sites often move to large sites.

  - Geographic distribution of respondents was targetted to be generally in line with distribution of computer sites generally, i.e.,

    - East - 24 interviews
    - Midwest - 28 interviews

    - South - 24 interviews
    - West - 20 interviews

  - Major industry targets were:

    - Finance (32 interviews)
    - Manufacturing (32 interviews)
    - Computer Service (8 interviews)
    - Other (24 interviews)

- Respondents were promised that their identity and that of the their company would not be revealed. As an incentive to take part, respondents were offered a summary of this study on its completion. NAS will review the summary before it is sent to respondents.

  - NAS was not identified as the client for the study. Most respondents did not appear to be greatly concerned about the study's sponsorship.

  - Those that were curious were just as likely to believe that IBM, Amdahl or NAS was the sponsor of the study.

- Interviews were conducted from mid-November to early January. Coincidentally, this was bracketed by the period when the IBM lawsuit was unresolved and in the news. This appeared to heighten some responses. However, for reasons that will be discussed later, INPUT does not believe that this had a material effect on the study's results.

C. RESPONDENT CHARACTERISTICS

- Before reviewing quantitative characteristics of respondents, it should first be stressed that the interviews were of a very high average quality.

  - The typical interview lasted 30 minutes with many, in the more complex installations, taking considerably more time.

  - Respondents were thoughtful and thorough. With a few exceptions, respondents were exceedingly frank in their appraisal of vendors, within the limits of their knowledge.

- Ninety-nine usable interviews were conducted (compared to a target of 96). One additional site from the NAS list was interviewed; it was a Burroughs installation and since it had no knowledge of the IBM-compatible world, INPUT decided to exclude it from the analysis.

  - Because of weather conditions, three Chicago interviews that were originally scheduled as on-site interviews were changed to telephone interviews.

  - As noted earlier, the high quality of the telephone interviews prevented this from being a problem.

- The type of hardware at the site and the size of the site/company were seen to be the most important variables, so these were the most tightly controlled.

  - Companies cannot be directly compared by their revenues since, for example, industrial companies, banks, insurance companies and retail establishments all use incomparable financial measures.

  - For that reason the annual value of hardware acquired was used as a common measure. This has the additional value to NAS of being a direct measure of customer size from NAS's viewpoint. Three groupings were established:

    - A acquisition rate of under $0.5 million per year.
    - A rate between $0.5 - $4.9 million.
    - A rate over $5.0 million.
    - Note: In cases where respondents were unable to respond, INPUT classified companies into one of these three groups based on other company characteristics.

  - The actual and target interviews figures were very close for the critical elements of site type and size (Exhibit I-1).

- In the course of the interviews it became clear that computer service bureaus had different characteristics from other industry groupings, therefore, a special effort was made to obtain interviews with service bureaus.

EXHIBIT I-1

SAMPLE CHARACTERISTICS

	NUMBER OF INTERVIEWS	
	ACTUAL	TARGET
SITE TYPES		
NAS	30	32
IBM	69	64
INDUSTRY TYPE		
FINANCE	20	32
MANUFACTURING	38	32
COMPUTER SERVICE BUREAU	12	8
OTHER	29	24
GEOGRAPHY		
NORTH EAST	40	24
MID WEST	24	28
SOUTHEAST	16	24
WEST	19	20
ANNUAL HARDWARE ACQUISITION RATE		
UNDER $0.5 MILLION	21	19
BETWEEN $0.5 - $4.0 MILLION	46	77
$5 MILLION AND OVER	32	
TOTAL	99	96

  - Since preliminary analysis did not indicate important differences by other industry types or geographic location, these two factors were given secondary importance (i.e., if there was a choice between a small IBM site in the south and a large NAS site in the east, the latter was selected).

  - INPUT believes that the industry and geographic groupings are representative and that there are no industry or geographic sampling skewings.

- A list of the companies interviewed is in Appendix B.

- During the interview process itself, INPUT generally approached the head of MIS initially. In about one-third of cases, this person gave the interview. (Exhibit I-2).

  - More commonly, INPUT was referred to a lower level manager in charge of the computer center or who specialized in hardware acquisition.

  - In a few cases INPUT interviewed a technical specialist or supervisor (generally in very small or very large companies, because of the manner in which tasks were allocated.)

- All respondents had a good picture as to how the acquisition process worked. The respondent's place in the organization was not seen to be significant as far as the quality or quantity of data obtained.

  - For example, while a Vice President might be somewhat more attuned to the overall political situation, a manager might be somewhat more willing to talk about it.

D. ANALYSIS AND MANAGEMENT PRESENTATION

- INPUT analyzed the data obtained using three basis "cuts" of the data:

  - NAS vs. IBM (only one competitive site was all Amdahl).

  - By industry (finance, manufacturing, service bureau and other).

EXHIBIT I-2

RESPONDENTS PROFILE

• HEAD OF MIS		36
– VICE PRESIDENT AND ABOVE	15	
– DIRECTOR/ASSISTANT VP	21	
• HEAD OF COMPUTER OPERATIONS/HARDWARE ACQUISITION		52
• OTHER (CAPACITY PLANNING SUPERVISOR/ PLANNER)		11

  - By size of site.

  - As noted, geography was not found to be significant.

- Most differences were those between NAS and IBM respondents.

  - In some cases large sites (i.e., those with an acquisition rate of greater than $5 million a year) or service bureaus had characteristics that were above or below average.

  - Where such differences are not cited, it can be assumed that they are not substantial.

- Many of the questions in the survey were intentially open-ended (see Appendix A). For analytic purposes, the responses were classified and grouped into umbrella categories for quantitative analysis.

- A presentation of the material contained in this report was presented orally to NAS staff at Mountain View on January 20, 1984 and constitutes the major portion of this final report.

II. MANAGEMENT SUMMARY

A. BACKGROUND

- This report was prepared by INPUT as a custom study for National Advanced Systems (NAS). The objective of this study is to identify, analyze and evaluate large-scale system user requirements within competitive, geographic and industry structure parameters.

- Ninety-nine NAS and competitive vendor installations were interviewed, using the questionnaire in Appendix A. The major segmentations for analysis was between NAS and competitive (i.e., IBM) installations and between large sites (i.e., an annual hardware acquisition rate of $5 million or more) and all sites.

- Virtually all respondents see the hardware acquisition process falling into three parts (Exhibit II-1).
    - An identification of needs (i.e., through capacity planning and performance measurements).
    - A recommendation that specific hardware be obtained from a specific vendor.
    - A final decision to proceed on the recommendation.
- Either MIS technical management or the head of MIS usually has the power to stop a particular acquisition.
    - Increasingly, non-MIS management has this same power also.
    - This tripartite division almost certainly works in favor of IBM and against the PCMs: IBM is the easy choice and, in some sense, the lowest common denominator of internal agreement.

B. ACQUISITION CRITERIA

- Price/performance, compatibility, service and reliability were all seen as key factors in hardware acquisitions made in the last year by 40-50% of respondents (Exhibit II-2).
    - Product characteristics (features, performance, etc.) were somewhat less important.
    - Vendor reputation and delivery/availability were important to only a small minority of respondents.
- Exhibit II-3 shows the major variances between respondents.
    - Price is much more important for NAS sites and service bureaus.

EXHIBIT II-1

PRIMARY HARDWARE ACQUISITION PROCESS

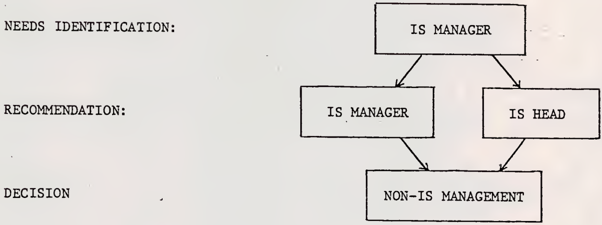


EXHIBIT II-2

KEY SELECTION FACTORS

FACTOR	PERCENT OF ALL RESPONDENTS CITING
PRICE/PERFORMANCE	49%
COMPATIBILITY	43%
SERVICE	39%
RELIABILITY	39%
PRODUCT CHARACTERISTICS	32%
VENDOR REPUTATION	11%
DELIVERY/AVAILABILITY	9%

EXHIBIT II-3

KEY FACTORS CITED (PERCENT OF RESPONDENTS)

RESPONDENT TYPE	PRICE	COMPAT-IBILITY	SERVICE	RELIA-BILITY	PRODUCT
ALL	49%	43%	39%	39%	32%
NAS SITES	*73%	*27%	33%	47%	30%
IBM SITES	39%	51%	42%	36%	33%
OVER $5 MILLION ANNUAL ACQUISITIONS	50%	34%	34%	31%	*50%
SERVICE BUREAUS	*100%	33%	42%	*58%	25%

* MAJOR VARIANCES

  - Compatibility is somewhat more important for IBM sites and less so for NAS sites, large sites and service bureaus.

  - Service is about as important to all types of respondents.

  - Reliability is much more important to service bureaus.

  - Product characteristics are more important to large sites; this is reasonable, since their major workloads make them interested in new, high performance products.

C. THE NAS IMAGE

- NAS has two main image problems among potential customers:

  - Those who would not buy a NAS product because of negative perceptions of NAS's future or its service capabilities (more of a problem at large sites).

  - Those who do not know enough about NAS to have any particular idea of its image (more of a problem at smaller sites).

- As Exhibit II-4 shows, these two factors together, would eliminate about 7 out of 10 potential prospects.

- This "locking out" of NAS is the critical problem because in head to head comparisons, NAS does well against IBM (Exhibit II-5).

  - Half of the IBM respondents who had an opinion felt that NAS had better products.

  - This was balanced by the half of NAS respondents who felt that IBM had better support.

  - Overwhelmingly, NAS was seen as having better financing and terms and conditions.

EXHIBIT II-4

NAS LOCKED-OUT OF IBM SITES

ATTITUDE TO NAS	IBM SITES	
	ALL	LARGE
UNABLE TO COMMENT	42%	23%
WOULD NOT BUY	26%	54%
TOTAL ("LOCKED-OUT")	68%	77%

EXHIBIT II-5

IBM AND NAS COMPARISONS

AREA	IBM BETTER		NAS BETTER	
	IBM RESP.	NAS RESP.	IBM RESP.	NAS RESP.
PRODUCTS	50%	17%	50%	83%
SUPPORT	94%	50%	6%	50%
FINANCING	7%	5%	93%	95%
TERMS	0%	0%	100%	100%

- In positive factors cited by respondents generally NAS also comes out well (Exhibit II-6). Only in service does IBM have a significant edge.

D. PLANNING ISSUES

- Respondents are far more willing to operate in a multi-vendor environment for peripherals than for CPU's. Not surprisingly, NAS sites were more willing than IBM sites to operate multi-vendor CPUs; However, even NAS sites are only mildly enthusiastic.

- Almost three-quarter of respondents see the IBM mainframe operating system as a current de facto standard. However, implicit in the majority attitude is that the de facto IBM standard is a changing one: The standard is really whatever IBM says it is at a particular point in time. Consequently, this attitude does not necessarily give comfort to PCMs.

- There was, on the average, moderate agreement that hardware companies should be total systems companies. However, since both NAS and IBM sites were as likely to strongly subscribe to this, there is no reason to believe that this is a very important factor in hardware selection.

- One-third of respondents themselves make a trade-off between maintenance service levels and equipment prices.

    - One-half of respondents would pay a premium for increased reliability as opposed to the best price/performance deal.

    - The average premium cited was 15%.

- There were few commonalities in respondents' identification of unmet needs; one-third of respondents could not identify any unmet needs.

- The more common trends foreseen include:

    - PCs, alone and in networks.

    - Price/performance improvements.

EXHIBIT II-6

POSITIVE FACTORS CITED: NAS, AMDAHL, IBM
(PERCENT OF RESPONDENTS)

FACTOR	VENDOR RATED:	NAS		AMDAHL		IBM	
	TYPE RESP:	NAS	IBM	NAS	IBM	NAS	IBM
PRICE		17%	10%	13%	38%	0%	7%
SERVICE		27%	6%	13%	12%	30%	62%
RELIABILITY		20%	7%	0%	9%	10%	28%
PRODUCT		43%	23%	30%	43%	33%	28%

- Increased IBM marketing competitiveness and flexibility,

E. RECOMMENDATIONS

- NAS must make itself known, in a positive way, to IBM sites. This can be done in two ways:

    - Exploit its objective record of uptime and service (e.g., in INPUT Field Service ratings).

    - Exploit its record among service bureaus.

- This study has shown that service bureau customers have much higher requirements than average for price/performance and reliability.

    - NAS almost certainly has higher penetration than average in the service bureau sector.

    - Very effective advertisements and other promotional material should be developed to show that NAS has high penetration in a demanding market that depends on computers even more than the average business.

- The question of NAS's long term future is one that, obviously, must be addressed somewhat differently. In general NAS must identify itself more strongly with its parent company and/or its Japanese supplier.

    - National Semiconductor could, for example, make a strong public statement concerning its long term commitment to NAS. The more concrete a statement, the more effect it would have.

    - NAS could also further highlight its ties to Hitachi. This would have a two-fold purpose:

        . To show that Hitachi is a large, strong company in for the long haul.

  - To reassure customers by implication that even if, for some reason, NAS exited the market that Hitachi would immediately take over and that NAS customers would be well off.

  - INPUT realizes that this Japanese identification strategy has risks since feelings against Japanese products are increasing in some circles (although sales have not been affected). The Hitachi-as-backup position should only be implied and never verbalized; otherwise, some people might interpret it as a statement of NAS's intent.

- However, NAS must take more active steps to get its story across to potential customers and take some risks if necessary. A more aggressive IBM may soon erode NAS's advantage in pricing, financing and general terms. NAS must hit hard if it is going to keep scoring.

III. HARDWARE ACQUISITION

A. THE HARDWARE ACQUISITION PROCESS

- Over 80% of the respondents interviewed had made an acquisition in the last year from either IBM, NAS or Amdahl.

  - Most acquiring companies had considered at least one other vendor.

  - Seventy percent of respondents had acquired equipment from IBM or had considered IBM. NAS and Amdahl were each considered by almost 40% of respondents.

    - Note: The NAS percentage is probably somewhat inflated since part of the sample was intentionally directed at NAS sites; Amdahl sites were not intentionally selected.

  - No other hardware manufacturer's equipment was considered or acquired by more than 20% of respondents (see Exhibit III-1).

EXHIBIT III-1

OTHER HARDWARE VENDORS: PURCHASED OR CONSIDERED

- BY 10-20% OF RESPONDENTS
  - STC
  - MEMOREX
  - DEC
- BY 5-10% OF RESPONDENTS
  - CDC
  - NCR
- OTHER VENDORS
  - BURROUGHS
  - CRAY
  - DG
  - HP
  - ITT
  - PRIME
  - SPERRY
  - TANDEM
  - TELEX

  - This is to be expected, since interview targets were IBM and PCM sites.

  - On the other hand, most respondents have had experience dealing with a wide variety of vendors.

- There are two basic ways that respondents manage the hardware acquisition and vendor selection process:

  - Making a single decision, extending over a period of years.

  - Making a new vendor selection for each acquisition.

- Slightly more companies favor the "single decision" approach (57%) than the "new selection" approach (51%). (Note: some companies employ both approaches.)

- There were no significant differences between different types of respondents.

  - In INPUT's experience, the single decision approach is more likely to be used by companies seriously committed to planning or those that are more bureaucratic in nature. These appear to be independent variables.

  - Companies make a new selection each time to take advantage of changes in technology and price/performance.

- Where a single decision is made, about half of companies have a 1-2 year horizon and the remainder a 3-5 year horizon.

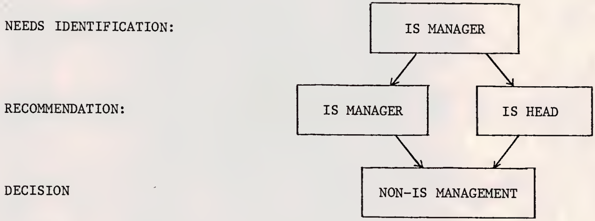
- About 40% of hardware budgets are for purchases, as opposed to lease/rental.

- There were no major differences by type of respondent for the above.

- Virtually all respondents see the hardware acquisition process falling into three parts:

EXHIBIT III-2

PRIMARY HARDWARE ACQUISITION PROCESS



  - An identification of needs (i.e., through capacity planning and performance measurement).

  - A recommendation that specific hardware be obtained from a specific vendor.

  - A final decision to proceed on the recommendation.

- As a general rule, needs identification is the responsibility of a manager within the MIS department; the recommendation is made within MIS and approved by non-MIS management (Exhibit III-2.)

- However, there are many exceptions to this general approach (see Exhibit III-3).

  - These variances are organization specific, i.e., general rules cannot be applied to learn in advance who does what inside a prospect company.

  - However, either MIS technical management or the head of MIS usually has the power to stop a particular acquisition.

  - Increasingly, non MIS management has this same power also.

  - This tripartite division almost certainly works in favor of IBM and against the PCMs: IBM is the easy choice and, in some sense, the lowest common denominator of internal agreement.

- The overall process takes an average of 5 months, although the range is from one month to over a year. Undoubtedly, most successful NAS acquisitions are on the upper part of the time scale. (The survey was not designed to uncover this fact).

B. HARDWARE SELECTION CRITERIA

- Since hardware selection criteria is such an important issue, the survey obtained this data in two different ways.

- Respondent's were first asked an open-end question on what were the key factors in acquisition during the last year.
- That was followed by a question which asked them to rate the importance of specific factors (see list in Exhibit III-4).

- Exhibit III-5 illustrates why it was important to ask this question in two ways: When presented with specific factors, respondents say that most are of moderate to high importance.

- This list rapidly shrinks when only key, volunteered factors are specified (Exhibit III-6).
  - Price/performance goes from medium importance to the highest importance.
    - Note, though, that only half of the respondents cited price/performance.
    - Price/performance tended to be either quite important or not very important.
  - Compatibility, service and reliability on the other hand, were seen as important by almost every one, but a key factor much less often. This was even more true of vendor reputation.
  - Product characteristics as a factor were similar to price/performance: Respondents saw it as quite important or relatively unimportant.

- Some of these factors were "knockout" items: if a vendor did not meet one of them, the vendor would be knocked out of contention, even if acceptable otherwise.
  - This is of particular concern of NAS and is examined in the next chapter.

EXHIBIT III-4

ACQUISITION FACTORS RATED

- VENDOR REPUTATION/IMAGE
- VENDOR FINANCIAL STANDING
- PRODUCT RELIABILITY
- HARDWARE COMPATIBILITY
- SOFTWARE COMPATIBILITY
- HARDWARE TECHNICAL CHARACTERISTICS (PERFORMANCE, ETC.)
- DELIVERY/AVAILABILITY
- HARDWARE MAINTENANCE
- SOFTWARE MAINTENANCE
- EDUCATION AND TRAINING
- PRICE/PERFORMANCE
- DISCOUNTS
- FINANCING ARRANGEMENTS
- TERMS AND CONDITIONS
- VENDOR-SUPPLIED SYSTEMS SOFTWARE
- VENDOR-SUPPLIED APPLICATIONS SOFTWARE
- AVAILABILITY OF OTHER SOFTWARE (I.E., PACKAGES FROM INDEPENDENT SUPPLIERS)

EXHIBIT III-5

WEIGHTED IMPORTANCE OF SELECTION FACTORS (ALL RESPONDENTS)

FACTOR	(1=LOW, 5=HIGH) WEIGHT
RELIABILITY	4.8
HARDWARE COMPATIBILITY	4.6
SOFTWARE COMPATIBILITY	4.6
HARDWARE MAINTENANCE	4.4
VENDOR REPUTATION	4.3
SOFTWARE MAINTENANCE	4.1
FINANCIAL STANDING	4.0
SYSTEM SOFTWARE	3.5
OTHER SOFTWARE	3.4
DELIVERY/AVAILABILITY	3.4
TERMS AND CONDITIONS	3.2
PRICE/PERFORMANCE	3.1
DISCOUNTS	3.1
FINANCING	2.8
HARDWARE TECHNICAL CHARACTERISTICS	2.5
EDUCATION AND TRAINING	2.2
VENDOR APPLICATION SOFTWARE	1.7

EXHIBIT III-6

KEY SELECTION FACTORS

FACTOR	PERCENT OF ALL RESPONDENTS CITING
PRICE/PERFORMANCE	49%
COMPATIBILITY	43%
SERVICE	39%
RELIABILITY	39%
PRODUCT CHARACTERISTICS	32%
VENDOR REPUTATION	11%
DELIVERY/AVAILABILITY	9%

- Generally, NAS and IBM sites saw things the same way when asked to provide weights to named factors. The exceptions are:

  - NAS sites are somewhat less concerned with vendor reputation, which is not surprising since they have chosen not to buy from IBM.

  - NAS sites place somewhat more emphasis on the importance of delivery and availability.

  - NAS sites placed much less importance on systems software; however, most of this difference was caused by service bureau respondents (who are far more self-sufficient as a class) and is probably not representative of NAS sites generally.

- However, the picture is somewhat different when only the key factors are considered (Exhibit III-7):

  - Price is much more important for NAS sites and service bureaus.

  - Compatibility is somewhat more important for IBM sites and less so for NAS sites, large sites and service bureaus.

  - Service is about as important to all types of respondents.

  - Reliability is much more important to service bureaus (as might be expected).

  - Product characteristics are more important to large sites; this is reasonable, since their major workloads make them interested in new, high performance products.

- The importance of these factors is essentially the same for CPU and peripheral acquisition.

EXHIBIT III-7

KEY FACTORS CITED (PERCENT OF RESPONDENTS)

RESPONDENT TYPE	PRICE	COMPAT-IBILITY	SERVICE	RELIA-BILITY	PRODUCT
ALL	49%	43%	39%	39%	32%
NAS SITES	*73%	*27%	33%	47%	30%
IBM SITES	39%	51%	42%	36%	33%
OVER $5 MILLION ANNUAL ACQUISITIONS	50%	34%	34%	31%	*50%
SERVICE BUREAUS	*100%	33%	42%	*58%	25%

* MAJOR VARIANCES

IV. VENDOR STRENGTHS AND WEAKNESSES

A. POSITIVE AND NEGATIVE PERCEPTIONS

- Exhibit IV-1, shows the positive views toward NAS, Amdahl and IBM as vendors that are held by respondents who are NAS or IBM sites.

  - IBM'S main strength in the eye's of almost two-thirds of their own customers is service. Note that marginally more NAS sites see IBM'S service as a positive factor than NAS service.

  - Both IBM and NAS respondents are somewhat more likely to see their own vendors' product as being more reliable than the other.

  - NAS and IBM are surprisingly close in terms of perceived price advantage: This may reflect IBM's increased flexibility.

  - Products are generally seen positively.

- The picture changes somewhat when negative views are examined (Exhibit IV-2):

  - In both service and product there is what might be termed the "grass is greener" syndrome where respondents held their own vendor to a stricter standard.

  - Amdahl is seen to suffer from a compatibility standpoint; IBM is downgraded by its own customers from the standpoint of reputation and marketing/image. At first this may seen surprising, but this is more explicable because of the reasons given:

    . IBM is just too big.
    . There has been confusion in IBM's marketing organization as the reorganization has crept downward.
    . Some customers are perceived as being favored over others.

EXHIBIT IV-1

POSITIVE FACTORS CITED: NAS, AMDAHL, IBM
(PERCENT OF RESPONDENTS)

FACTOR	VENDOR RATED:	NAS		AMDAHL		IBM	
	TYPE RESP:	NAS	IBM	NAS	IBM	NAS	IBM
PRICE		17%	10%	13%	38%	0%	7%
SERVICE		27%	6%	13%	12%	30%	62%
RELIABILITY		20%	7%	0%	9%	10%	28%
PRODUCT		43%	23%	30%	43%	33%	28%

EXHIBIT IV-2

NEGATIVE FACTORS CITED: NAS, AMDAHL, IBM
(PERCENT OF RESPONDENTS)

	VENDOR RATED:	NAS		AMDAHL		IBM	
FACTOR	TYPE RESP:	NAS	IBM	NAS	IBM	NAS	IBM
PRICE		0%	1%	7%	3%	23%	14%
SERVICE		27%	19%	13%	16%	10%	17%
RELIABILITY		0%	4%	7%	4%	0%	0%
PRODUCT		10%	1%	17%	6%	7%	14%
REPUTATION		23%	44%	23%	26%	7%	12%
COMPATIBILITY		3%	3%	7%	20%	0%	0%
MARKETING/IMAGE		7%	11%	7%	6%	7%	28%

- The most important issue for NAS is the low reputation rating it received both from NAS and IBM sites. Virtually all of this negative feeling is a result of concern over NAS's financial standing and long term viability.

- Exhibit IV-3 looks at the perception of IBM respondents, with the responses of large IBM sites broken out separately: They are also very concerned over NAS service levels.

B. "KNOCK-OUT" ISSUES

- The question regarding negative perceptions is, of course, just how important are they? In the survey, a follow-up question was: "Are any of these weaknesses important enough so they would cause you not buy from that vendor?"

    - One-quarter of IBM sites would not buy NAS hardware (Exhibit IV-4).

    - Over half of large IBM sites would not do so (Exhibit IV-5).

    - The primary reason for their doing so is uncertainty over NAS's future, followed by doubts over service (Exhibit IV-6).

        - In INPUT's opinion, this response would not have differed appreciably even if the lawsuit had not been in the news during the interview process.

- The lawsuit, however, certainly highlighted the "Japanese connection". For these respondents, an off-shore supplier raises questions over both certainty of supply and commitment to the U.S. market.

- In many ways a more troubling factor is the lack of knowledge that many IBM respondents have concerning NAS.

    - Over 40% of all IBM respondents did not feel that they knew enough about NAS to make any substantive comments about NAS (Exhibit IV-7). A few were actually totally ignorant of NAS.

EXHIBIT IV-3

NEGATIVE FACTORS CITED BY IBM RESPONDENTS:
NAS, AMDAHL, IBM (PERCENT OF RESPONDENTS)

FACTOR	VENDOR RATED:	NAS		AMDAHL		IBM	
	TYPE RESP.:	ALL	LARGE	ALL	LARGE	ALL	LARGE
PRICE		1%	0	3%	0	14%	8%
SERVICE		19%	35%	16%	15%	17%	27%
RELIABILITY		4%	8%	4%	8%	0	0
PRODUCT		1%	4%	6%	12%	14%	12%
REPUTATION		44%	46%	26%	27%	12%	15%
COMPATIBILITY		3%	8%	20%	42%	0	0
MARKETING/IMAGE		11%	23%	6%	8%	28%	27%

EXHIBIT IV-4

PERCENT OF RESPONDENTS WHO WOULD NOT BUY FROM A PARTICULAR VENDOR BECAUSE OF A VENDOR WEAKNESS

	TYPE OF RESPONDENT	
VENDOR	IBM SITE	NAS SITE
AMDAHL	41%	10%
BURROUGHS	12%	27%
DEC	4%	0
HP	6%	3%
IBM	1%	0
NAS	26%	0

NOTE: QUESTION WAS DESIGNED NOT TO TEST FAITHFULNESS TO IBM, BUT THE EXTENT TO WHICH ANY VENDOR WOULD BE EXCLUDED.

EXHIBIT IV-5

PERCENT OF RESPONDENTS WHO WOULD NOT BUY FROM A PARTICULAR VENDOR BECAUSE OF A VENDOR WEAKNESS: IBM RESPONDENTS

	TYPE OF RESPONDENT	
VENDOR	ALL	LARGE
AMDAHL	41%	42%
BURROUGHS	12%	12%
DEC	4%	4%
HP	6%	0
IBM	1%	0
NAS	26%	54%

NOTE: QUESTION WAS DESIGNED NOT TO TEST FAITHFULNESS TO IBM, BUT THE EXTENT TO WHICH ANY VENDOR WOULD BE EXCLUDED.

EXHIBIT IV-6

REASONS FOR LARGE IBM SITES NOT CONSIDERING NAS

REASON	PERCENTAGE
UNCERTAINTY OVER NAS FUTURE FINANCES (21%) GENERAL UNCERTAINTY (28%) JAPANESE CONNECTION (7%)	57%
SUPPORT/SERVICE	29%
PRODUCT (RELIABILITY, ABILITY TO KEEP UP WITH IBM)	14%
	100%

EXHIBIT IV-7

LACK OF KNOWLEDGE OF NAS

VENDOR	PERCENT UNABLE TO COMMENT IBM SITES	PERCENT UNABLE TO COMMENT NAS SITES
AMDAHL	16%	13%
BURROUGHS	49%	27%
DEC	26%	37%
HP	50%	53%
IBM	0	0
NAS	42%	0

- The picture is somewhat brighter at large IBM sites where only 23% could not comment (Exhibit IV-8).

- NAS' problem is that in the critical, large IBM accounts less than one-quarter of sites are even able to consider NAS (Exhibit IV-9).
    - Roughly one-quarter do not know enough.
    - Over half will not consider NAS.

C. IBM AND NAS COMPARISONS

- This "locking out" of NAS is disappointing because in head to head comparisons, NAS does well against IBM (Exhibit IV-10).
    - Half of the IBM respondents who had an opinion felt that NAS had better products.
    - This was balanced by the half of NAS respondents who felt that IBM had better support.
    - Overwhelmingly, NAS was seen as having better financing and terms and conditions.

- Typical comments on NAS include the following:
    - "Runs rings around IBM in FE and SE support".
    - "NAS kicks pants off everyone" in regard to "best manufactured" CPU's and Disks.
    - "A strange company" - carries on "ITEL dealmaking tradition."
    - "Will have to recover" from Hitachi situation.

EXHIBIT IV-8

LACK OF KNOWLEDGE OF NAS: IBM RESPONDENTS

VENDOR	PERCENT UNABLE TO COMMENT	
	ALL	LARGE
AMDAHL	16%	0
BURROUGHS	49%	54%
DEC	26%	38%
HP	50%	50%
IBM	0	0
NAS	42%	23%

EXHIBIT IV-9

NAS LOCKED-OUT OF IBM SITES

ATTITUDE TO NAS	IBM SITES	
	ALL	LARGE
UNABLE TO COMMENT	42%	23%
WOULD NOT BUY	26%	54%
TOTAL ("LOCKED-OUT")	68%	77%

EXHIBIT IV-10

IBM AND NAS COMPARISONS

	IBM BETTER		NAS BETTER	
AREA	IBM RESP.	NAS RESP.	IBM RESP.	NAS RESP.
PRODUCTS	50%	17%	50%	83%
SUPPORT	94%	50%	6%	50%
FINANCING	7%	5%	93%	95%
TERMS	0%	0%	100%	100%

EXHIBIT III-3

THE HARDWARE ACQUISITION PROCESS: DETAIL

	ORGANIZATION LEVEL (PERCENT OF RESPONDENTS)				
		I.S.			
TYPE OF ACTION	TECH.	MGR.	HEAD	COMMITTEE	GEN'L MGMT.
NEED IDENTIFICATION	4%	72%	8%	16%	-
RECOMMENDATION	-	40%	43%	17%	-
DECISION	-	-	34%	20%	46%

- "Others in organization were concerned about NAS choice until after bench marks were completed".

- May not buy from in the future because future market share is doubtful.

V. PLANNING ISSUES AND TRENDS

A. MULTI-VENDOR ENVIRONMENT

- Respondents were asked what they saw as the advantages and disadvantages to operating in a multi-vendor environment.

  - The chief advantages seen are increased leverage over vendors and better price (Exhibit V-1).

  - "Fingerpointing" between vendors is the price paid. "Leverage" and "fingerpointing" are virtually two sides to the same coin.

- Respondents are far more willing to operate in a multi-vendor environment for peripherals than for CPU's (Exhibit V-2). Not surprisingly, NAS sites were more willing than IBM sites to operate multi-vendor CPUs; However, even NAS sites are only mildly enthusiastic.

B. COMPATIBILITY

- Most (82%) respondents agreed that operating system compatibility is a key factor in hardware selection.

  - Almost as many (72%) see the IBM mainframe operating system as a current de facto standard.

  - Most of the remaining respondents felt IBM would not allow this to happen.

  - It should be pointed out that implicit in the majority attitude is that the de facto IBM standard is a changing one: The standard is really whatever IBM says it is at a particular point in time. Consequently, this attitude does not necessarily give comfort to PCMs.

EXHIBIT V-2

WILLINGNESS TO OPERATE MULTI-VENDOR ENVIRONMENT

	IBM SITES	NAS SITES
CPU'S	-0.7	+1.6
PERIPHERALS ONLY	+2.6	+3.1

KEY: +5 = HIGHLY IN FAVOR
-5 = HIGHLY OPPOSED

C. HARDWARE COMPANIES AS SYSTEMS COMPANIES

- There was, on the average, moderate agreement by respondents that hardware companies ought to be comprehensive systems companies, i.e., offering full solution to central computing, factory, office problems, etc. (Exhibit V-3).
  - This was felt to be the case slightly more by IBM than NAS sites.
  - It was also felt to be somewhat more of a factor three to five years from now.
- There was a wide range of opinion on this issue; almost half of respondents felt strongly (i.e., gave a +4 or +5 rating) that this was a current requirement.
  - There were no differences between NAS and IBM sites in this respect. Consequently, such attitudes do not seem to affect current buying decisions.
  - This fact, combined with the fact that a majority of respondents still do not attach a great deal of importance to this requirement, indicates that this should not be a critical issue in hardware selection for some time to come.
  - Almost three-quarter of respondents saw IBM suited to handle the role of total systems company. However, substantial numbers of respondents seemed to doubt if IBM would or could fill this role. About one in twenty respondents saw NAS (or Amdahl) as suited to fill this role.

D. MAINTENANCE ISSUES

- One-third of respondents themselves make a trade-off between, maintenance service levels and equipment prices.
  - NAS sites are somewhat less likely to do so.

EXHIBIT V-3

HARDWARE COMPANIES AS SYSTEM COMPANIES

	PERCENT OF RESPONDENTS AGREEING	
	IBM SITES	NAS SITES
NOW	2.3	2.0
3-5 YEARS IN FUTURE	3.0	2.4

KEY: +5 = STRONG AGREEMENT
-5 = STRONG DISAGREEMENT

EXHIBIT V-1

ADVANTAGES AND DISADVANTAGES OF A MULTIVENDOR ENVIRONMENT

ADVANTAGES	PERCENT OF RESPONDENTS
LEVERAGE	51%
PRICE	46%
CHOICE OF PERFORMANCE	20%
DISADVANTAGES	
"FINGERPOINTING"	70%
INCREASED MANAGEMENT REQUIREMENT	14%
COMPATIBILITY	14%
SERVICE	6%

- One-half of respondents would pay a premium for increased reliability as opposed to best price/performance deal.
    - There were no significant differences by respondent type.
    - The average premium cited was 15%.

E. FUTURE DIFFERENCES BETWEEN HARDWARE VENDORS

- NAS sites were somewhat more likely than IBM sites to see differences widening in the future between vendors generally (Exhibit V-4).
    - This difference was largely caused by some IBM respondents seeing major competitors dropping out of the market.
    - In general, changes in technology was seen as both widening and narrowing differences. The IBM PC was an exception in that it was seen as a unifying force.
    - IBM was seen as becoming more like other vendors in terms of its marketing practices (pricing, terms, etc.).
- When IBM and NAS were directly compared (by half of the NAS respondents and one-quarter of the IBM respondents), the picture was somewhat different (Exhibit V-5):
    - Here, IBM sites were much more likely to see differences. This was because IBM respondents were far more likely to see IBM as a dynamic force than NAS sites.
    - NAS sites were more likely to see the situation remaining unchanged concerning IBM vs. NAS than among hardware vendors generally.

EXHIBIT V-5

IBM VS. NAS: FUTURE

FUTURE DIFFERENCES BETWEEN IBM AND NAS	IBM SITES	NAS SITES
MORE DIFFERENCES	52%	31%
FEWER DIFFERENCES	31%	31%
UNCHANGED	17%	38%

EXHIBIT V-4

HARDWARE VENDOR DIFFERENCES

FUTURE DIFFERENCES BETWEEN VENDORS GENERALLY	IBM SITES	NAS SITES
MORE DIFFERENCES	24%	35%
FEWER DIFFERENCES	41%	45%
UNCHANGED	35%	20%

F. UNMET NEEDS AND FUTURE TRENDS

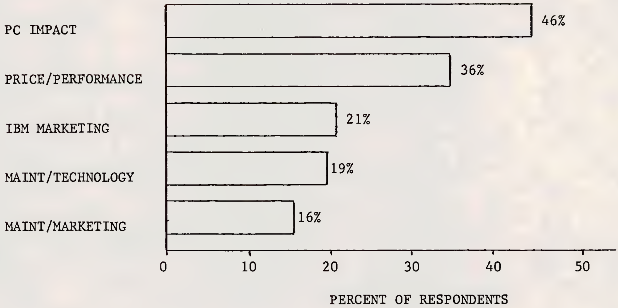
- There were in general little pattern to respondents' perception of their unmet needs.
  - One-third of respondents could not identify any major unmet needs; IBM and NAS sites were similar in this respect.
  - For those that could, there was striking diversity to their needs and little common pattern. Appendix C provides examples of cited needs.
- Many trends were seen by respondents. Many of the trends were in fact expectations that the previously described needs would be met.
- There were a number of common trends seen (Exhibit V-6).
  - The impact of the PC, on both users and networks was noted by almost half of respondents.
  - On-going improvements in price, performances and packaging was also expected.
  - Less common trends seen were:
    - . Increased competitiveness and flexibility by IBM in marketing and sales.
    - . Remote and self-maintenance.
    - . Unbundled maintenance.

VI. RECOMMENDATIONS

- NAS has two major problems.
  - A significant number of IBM sites have a low awareness of NAS and its products.

EXHIBIT V-6

TRENDS SEEN BY RESPONDENTS



  - Of those that are aware of NAS, a large number would not now consider doing business with it.
  - About 7 out of 10 IBM sites fall into one or the other category. In INPUT's view such a large number of "locked-out" prospects cannot be ignored by NAS.

- NAS must make itself known, in a positive way, to IBM sites.
  - INPUT believes that while IBM can conduct general image-based advertising to reinforce an already-known image, NAS cannot do so: it has very little image of any kind to reinforce.
  - The results of this study suggest to INPUT two ways in which NAS can start to build a factual, concrete image in the eyes of potential customers:
    - . Exploit its objectives record of uptime and service.
    - . Exploit its record among service bureaus.

- Appendix D contains extracts from INPUT's Field Service Program (which NAS subscribes to).
  - NAS does extremely well in head-to-head comparisons against IBM.
  - These facts are undoubtedly little known to the world at large.
  - Besides addressing NAS's general image need, these facts would also address two of the key buying criteria: reliability and service.

- Similarly, this study has shown that service bureau customers have much higher requirements than average for price/performance and reliability.

- NAS almost certainly has higher penetration than average in the service bureau sector.

- Very effective advertisements and other promotional material should be developed to show that NAS has

  . High penetration,

  . In a demanding market,

  . That depends on computers even more than the average business.

- The question of NAS's long term future is one that, obviously, must be addressed somewhat differently. In general NAS must identify itself more strongly with its parent company and/or its Japanese supplier.

  - National Semiconductor could, for example, make a strong public statement concerning its long term commitment to NAS. The more concrete a statement, the more effect it would have. This could be especially important in view of the recent announcement of STC concerning its withdrawal from the PCM business.

  - NAS could also further highlight its ties to Hitachi. This would have a two-fold purpose:

    . To show that Hitachi is a large, strong company in for the long haul.

    . To reassure customers by implication that even if, for some reason, NAS exited the market that Hitachi would immediately take over and that NAS customers would be well off.

  - INPUT realizes that this Japanese identification strategy has risks since feelings against Japanese products are increasing in some circles (although sales have not been affected). The Hitachi-as-backup position should only be implied and never verbalized; otherwise, some people might interpret it as a statement of NAS's intent.

- However, NAS must take more active steps to get its story across to potential customers and take some risks in doing so, if necessary. The unleashed, aggressive IBM may soon erode NAS's advantage in pricing, financing and general terms. NAS must hit hard if it is going to keep scoring.

APPENDIX A: QUESTIONNAIRE

INPUT

SYSTEM USER QUESTIONNAIRE

Hello, my name is ______________ and I am with ___________________________. We are performing a study on current and future hardware needs and how vendors can better meet them. All the information you provide us will be kept confidential and used for statistical purposes only and neither your name or that of your firm will be linked to any information you supply. In return for your cooperation, we will send you a summary of our study at no charge.

1a. What is your hardware configuration, both that currently installed and that on order?

			NUMBER OF UNITS	
TYPE	VENDOR	MODEL	INSTALLED	ON ORDER
CPU				
MEMORY				
DISK				
TAPE				
CRT's				
COMMUNICATIONS HARDWARE				
OTHER				

Ib. About how much hardware are you acquiring annually on a purchase value basis (e.g., in the 1981-1983 timeframe)? (INTERVIEWER NOTE: "Hardware" includes CPU, main memory, tape and disk drives, printers, CRT's, communication controllers. Make sure that this is converted into equivalent purchase value.)

$______ million

Ic. How does your hardware budget break down between new purchases, rental/lease and maintenance? (NOTE: PREFER AN ANSWER IN ACTUAL DOLLARS, BUT WILL ACCEPT A PERCENTAGE BREAK OUT.)

	DOLLARS	PERCENTAGE
New Purchases	______	______
Rental/Lease	______	______
Maintenance	______	______
Total		100%

Id. What hardware vendor(s) have you purchased from in the past year?

____

____

____

____

____

Ie. What other vendors did you seriously consider? ______________

____

____

____

____

If. Do you go through a new equipment or vendor selection process each time you make a hardware acquisition or do you make a single longer term decision and then implement it in stages?

( ) New selection each time. Why? ______________________________

____

____

( ) Single decision.

- Why? ____

____

____

- How long a period does it cover? ________
- Do you look at all system components (e.g., CPU and peripherals) at the same time or at different times?
  - ( ) Same time
  - ( ) Different times

( ) Other (describe) ______________________________________

____

____

____

2. What is the process your company goes through in acquiring new hardware? I.e.,

- What process is used to identify hardware needs? ______________

____

____

____

- Who does it? ____

____

____

____

- Who makes the recommendation to acquire particular hardware?

- Who makes the final decision?

- About how long does the whole process take?

3a. In equipment acquisitions made in, say, the past year what were the key factors that made you select particular equipment and/or vendors?

3b. Was there any difference in CPU and peripheral acquisitions?

4a. In selecting hardware, how important are each of the following criteria in your acquisition process? Is there any difference between CPU's, peripherals or other equipment?

	IMPORTANCE*			
CRITERIA	CPU	PERIPHERALS	OTHER	4b
General reputation of vendor				
Financial standing of vendor				
Hardware reliability				
Current and future hardware compatibility				
Current and future software compatibility				
Technical features of hardware				
Delivery dates				
Hardware maintenance				
Software maintenance				
Education and training				

4. Continued.

CRITERIA	IMPORTANCE*			4b
	CPU	PERI-PHERALS	OTHER	
Price/performance				
Discounts				
Financing arrangements				
Terms and conditions				
Vendor-supplied systems software				
Vendor-supplied application software				
Availability of other software				
Other factors (describe)				

* 1 = Low, 5 = High.

4b. For criteria that you felt were the most important (those marked "4" or "5"), how well do current (or future) hardware offerings meet your needs?

5. Are there explicit trade-offs made between maintenance service levels and equipment price:

( ) By you?

( ) By the hardware vendor?

6.a. Right now, operating system compatibility is considered by some to be a critical factor in selecting hardware in both the mainframe and personal computer areas. Do you agree? ( ) Yes ( ) No

- Why? Please give details. ______________________________

6b. Do you see at least defacto standards emerging in the future so that operating system compatibility will be much less of an issue,

- For mainframes? ( ) Yes ( ) No
  - Why? ______________________________
  - If YES: How soon? ______________________________
- For PC's? ( ) Yes ( ) No
  - Why? ______________________________

7a. What would you say are the major strengths and weaknesses and overall image of each of the following hardware vendors below? (GET DETAIL):

	STRENGTHS	WEAKNESSES	IMAGE
Amdahl			
Burroughs			
Digital Equipment Corp. (DEC)			

7a. Cont'd

Hewlett-Packard (HP)

IBM

National Advanced Systems (NAS)

7b. Are any of these strengths and weaknesses important enough so they would cause you to buy or not buy from that vendor?

( ) YES

- Would buy from _____ because

- Would not buy from _____ because

( ) No

7c. How should each of these companies change their images to be more successful?

Amdahl

Burroughs

DEC

Hewlett-Packard
HP

IBM

NAS

8a. Please tell me how much you agree or disagree with the following statement (with +5 being strong agreement and -5 being strong disagreement): "Hardware vendors must now be systems companies. Their offerings must be able to support a broad set of uses, such as central and distributed data processing, office and factory automation, end user computing (through both information centers and personal computing) and micro-mainframe links".

- Agreement = ____

- Why? ____

____

____

____

____

8b. What would your level of agreement be if we were talking about the situation 3 to 5 years in the future?

- Agreement = ____

- Why? ____

____

____

____

8c. Which of the following vendors do you see as being particularly suited to supply these broad systems applications? Why?

	SUITED	NOT SUITED
Amdahl		
Burroughs		
DEC		

8c. Cont'd

Hewlett-Packard

IBM

NAS

9a. What do you see as the strengths and weaknesses of operating in a multi-vendor environment?

- Strengths

- Weaknesses

9b. On balance, what is your company's view of operating a multi-vendor installation (+5 = highly in favor; -5 = highly opposed)

- Two or more vendor CPU's at same site ____

- Same CPU's, different peripherals ____

9c. Where you are considering acquiring hardware from a PCM, would you

- Pay premium for increased reliability as opposed to getting the most favorable price/performance deal?

  Yes ( ) No ( )

  - If YES, about how much? _____%

10a. I would like to understand the differences you see between vendors in terms of their products, support provided, terms offered or other factors. Taking, for example, two of the vendors you have dealt with, __________ and ____________, (FROM QUESTIONS 1d. AND 1e.) how would you compare them in terms of their products, support, terms and other factors that are important to you?

FACTOR	VENDOR______	VENDOR ________
Product		
Support		
Financing Terms		

10a. Cont'd

Other Terms
and Conditions

Other factors
(describe)

INPUT

10b. Do you see the amount of difference between these two vendors, as well as hardware vendors generally, becoming more or less pronounced over the next few years?

- These two vendors? ( ) More differences
  ( ) Fewer differences ( ) Unchanged

  - Why? ______________________________

  ____

  ____

  ____

  ____

- Vendors generally? ( ) More differences
  ( ) Fewer differences ( ) Unchanged

  - Why? ______________________________

  ____

  ____

  ____

  ____

11a. What needs do you have (or expect to have in the future) that hardware vendors are not meeting? (PROMPT FROM FOLLOWING LIST, IF NECESSARY).

- Hardware-related (such as throughput, price/performance, etc.)
- Operating system related.
- Specific applications.
- Support.
- Education and training.

11b. What sort of vendor do you believe will best be able to meet these needs? Please be as specific as possible. ____________________

____

____

____

____

12. What trends do you see regarding hardware over the next five years from the standpoint of:

- Technology

- Marketing practices

- Support

APPENDIX B: COMPANIES INTERVIEWED

APPENDIX B: COMPANIES INTERVIEWED

AFIA Worldwide Insurance
Aladdin Industries
Alpha Beta
Ameritrust
The Andover Companies
Ashland Oil
Atlantic Richfield Oil Company
Bank of Boston
Bausch & Lomb
Becton, Dickinson & Company
Boston Gas Company
State of California
Candata Inc.
Casual Corner
Caterpillar Tractor
Central Trust
Chase Manhattan Bank
Chicago, Milwaukee, St. Paul & Pacific
Christian Broadcasting Network
Cigna Corporation
Citicorp
University of Colorado at Boulder
Communication Data Services
Computer Power Inc.
Compusource
Comserv
Comshare
Computer Systems Design
Corporate Systems
Crocker National Bank
Dana Corporation
Daniel Industries
Del Monte Corporation
Delta Airlines
Dialogue Information Services

Diamond Power
EDS
Educational Testing Service
Emery Air Freight
ESNA
European American Bank
Exxon Corporation
Faberge
Farrell Lines
Fidelity Bank
Finserv Computer Corporation
First National Bank of South Carolina
John Fluke Manufacturing Company
Foodarama Supermarkets, Inc.
General Motors
Genesco, Inc.
Genrad, Inc.
Gibraltar Savings & Loan Association
Gold Medal Products Company
Goldome
GrandMet
GTE Data Services
Hallmark Cards
John Hancock Mutual
Harley Davidson
Hills Department Store
Humana
Illinois Central Gulf
Informatics
Jamesway Corporation
Kaman Sciences/Kaman Corporation
Lincoln National Corporation
LSI Logic
McCormack & Dodge
McRae's, Inc.
Methodist Hospital
Metropolitan Life

Mitre Corporation
Mobil Corporation
Montgomery Ward & Company
Morton Thiokle
Murphy Motor Freight
Mutual Benefit Life Insurance
National Processing Company
NL Industries, Inc.
C.E. Nichoff & Company
Pacific Gas & Electric
Commonwealth of Pennsylvania
R.L. Polk
Prince Georges County
Ralphs Grocery
Random House
Raytheon Company
Rohr Industries
Saunders Leasing Systems
Peter J. Schmitt Company, Inc.
Security Pacific Bank
Singer Kearfott
Standard Oil Company of California
Standard Oil Company of Indiana
Stauffer Chemical Company
Transportation Management Services
Tultex Corporation
Union 76
Utica Mutual

APPENDIX C

UNMET NEEDS EXAMPLES

- IMAGE PROCESSING
- MICRO-MAINFRAME
- MORE POWERFUL PROCESSOR (E.G., TRILOGY)
- IMPROVED DISK PRICE/PERFORMANCE
- BULK DATA TRANSFER
- "FUNCTION SPECIFIC" HARDWARE (E.G., TRANSACTION, INTERACTIVE, ETC.)
- APPLICATION CAPABILITY
- PC-CPU INTERFACES
- OA-DP INTEGRATION
- TELECOMMUNICATIONS INTEGRATION
- SOFTWARE INTEGRATION
- INCREASED THROUGHPUT
- COMMUNICATIONS NETWORKING INTEGRATION
- DATA BASE FACILITY INTEGRATION
- DATA BASE-OPERATING SYSTEM INTEGRATION
- WORLD-WIDE MARKETING COORDINATION
- VENDOR CONSULTING
- MULTIPLE OPERATING SYSTEM/COMMUNICATIONS CAPABILITY
- AUTOMATED TOOLS FOR COMPUTER ROOM
- STORAGE OF LARGE DATA SETS FOR DISTRIBUTED USE

UNMET NEEDS EXAMPLES - CONT'D.

- OPTICAL STORAGE
- LAN'S
- TSO REPLACEMENT
- IMS REPLACEMENT
- USER-FRIENDLY WORKSTATION
- EFFECTIVE MASS STORAGE
- USER-FRIENDLY OPERATING SYSTEM FOR END-USERS
- OA: HIGH CAPABILITIES USER-FRIENDLENESS

APPENDIX D: EXCERPTS FROM INPUT FIELD SERVICE REPORT

- The following excerpts show NAS's extremely positive showing compared to hardware vendors generally, especially IBM, across a wide variety of rating areas.

EXHIBIT VII-1

USER RATING OF LARGE-SYSTEM VENDORS
(OVERALL IMAGE)

VENDOR	OVERALL RATING	STANDARD DEVIATION	NUMBER OF RESPONSES
Amdahl	8.53	1.08	34
Burroughs	6.75	1.99	28
CDC	7.46	1.69	24
Cray	8.60	0.97	10
DEC	7.83	1.34	30
Data General	7.43	2.11	21
Honeywell	7.27	1.53	33
IBM	8.25	1.16	53
NAS	8.37	1.65	30
Perkin Elmer	6.95	2.48	20
Tandem	6.90	2.13	10
Univac	7.55	1.63	31
Total			324

Rating: 1 = Low, 10 = High

©1983 by INPUT. Reproduction Prohibited.

EXHIBIT III-9

USER SERVICE REQUIREMENTS VERSUS LEVEL OF SERVICE RECEIVED
VENDOR: NAS

TYPE OF SERVICE PROVIDED	AVERAGE LEVEL OF SERVICE*		PERCENT OF USERS REQUIRING		
	REQUIRED	RECEIVED	Less than Average Level of Service Provided (OVERKILL)	Equal or Greater than Average Level of Service and Get It (SATISFIED)	Equal or Greater than Average Level of Service and Receive Less (DISSATISFIED)
Environmental Planning	6.40	5.60	30.0%	33.3%	36.7%
Physical Site Planning	6.20	5.47	26.7	46.6	26.7
Consulting	5.50	5.33	43.3	33.3	23.4
Documentation	6.67	4.57	40.0	13.3	46.7
Training	6.30	4.60	33.3	20.0	46.7
Installation Planning	6.83	6.10	26.7	46.6	26.7
Hardware Maintenance	9.23	8.73	10.0	50.0	40.0
Software Maintenance	6.63	5.43	36.7	16.7	46.6
Supplies Sales	4.73	1.03	46.7	0	53.3
Add-on Sales	5.63	4.73	26.6	36.7	36.7
Site Audits	4.37	3.10	40.0	36.7	23.3
Relocation	4.63	4.47	40.0	36.7	23.3
De-installation	5.80	5.93	43.3	43.3	13.3

* Rating: 1 = Low, 10 = High

▨ = Area requiring improvement

©1983 by INPUT. Reproduction Prohibited.

EXHIBIT IV-1

SYSTEM AVAILABILITY - USER REQUIREMENTS VERSUS VENDOR ACTUALS

VENDOR	MEAN TIME (Hours) REQUIRED	MEAN TIME (Hours) ACTUAL	NUMBER OF RESPONSES REQUIRED	NUMBER OF RESPONSES ACTUAL
All Vendors	96.79%	96.77%	317%	306%
Amdahl	97.67	97.86	32	31
Burroughs	97.93	98.19	27	27
CDC	95.83	95.23	24	24
Cray	96.39	96.94	10	10
DEC	96.32	96.55	30	24
Data General	92.32	95.04	21	21
Honeywell	97.63	96.83	33	32
IBM	97.68	97.66	53	48
NAS	97.89	97.90	30	30
Perkin Elmer	94.71	92.18	18	20
Tandem	98.09	97.38	8	10
Univac	96.63	97.25	31	29

©1983 by INPUT. Reproduction Prohibited.

EXHIBIT IV-6

REQUIREMENTS FOR RESPONSE TIME TO HARDWARE FAILURES VERSUS ACTUALS BY VENDOR

VENDOR	MEAN TIME (Hours)		NUMBER OF RESPONSES
	REQUIRED	ACTUAL	
All Vendors	1.78	1.68	324
Amdahl	1.38	0.99	34
Burroughs	1.10	0.82	28
CDC	1.40	0.89	24
Cray	0.68	0.61	10
DEC	2.15	1.84	30
Data General	2.98	2.25	21
Honeywell	1.45	1.36	33
IBM	1.22	0.72	53
NAS	1.17	0.75	30
Perkin Elmer	6.65	7.20	20
Tandem	1.30	1.00	10
Univac	1.26	1.21	31

©1983 by INPUT. Reproduction Prohibited.

EXHIBIT IV-11

SYSTEM REPAIR TIME EXPERIENCED BY USERS
(HOURS)

VENDOR	MEAN	STANDARD DEVIATION	NUMBER OF RESPONSES
All Vendors	3.45	6.56	307
Amdahl	1.80	1.00	32
Burroughs	3.70	8.99	27
CDC	2.21	1.77	24
Cray	1.14	0.86	9
DEC	4.57	5.58	29
Data General	5.79	10.73	19
Honeywell	3.11	4.32	32
IBM	2.48	3.51	49
NAS	1.92	1.10	28
Perkin-Elmer	8.78	13.20	20
Tandem	6.60	14.59	10
Univac	2.86	4.31	28

Rating: 1 = Low, 10 = High

©1983 by INPUT. Reproduction Prohibited.

EXHIBIT IV-12

USER RATINGS OF VENDOR ABILITY TO DIAGNOSE HARDWARE PROBLEMS AND TO MAKE QUALITY REPAIRS

VENDOR	MEAN	STANDARD DEVIATION	NUMBER OF RESPONSES
All Vendors	7.69	1.79	322
Amdahl	8.32	1.20	34
Burroughs	7.32	1.76	28
CDC	7.33	1.86	24
Cray	8.30	1.25	10
DEC	7.63	1.73	30
Data General	7.71	1.52	21
Honeywell	7.52	1.46	33
IBM	8.29	1.08	51
NAS	8.40	1.69	30
Perkin Elmer	6.85	2.28	20
Tandem	6.10	2.47	10
Univac	7.55	1.80	31

Rating: 1 = Low, 10 = High

©1983 by INPUT. Reproduction Prohibited.

EXHIBIT V-2

USER RATINGS OF VENDOR SERVICE MANAGEMENT COMMUNICATIONS AND GENERAL RESPONSIVENESS OF VENDOR SERVICE ORGANIZATIONS

VENDOR	MANAGEMENT COMMUNICATIONS			GENERAL RESPONSIVENESS		
	Mean	Standard Deviation	Number of Responses	Mean	Standard Deviation	Number of Responses
All Vendors	7.44	1.80	322	7.85	1.80	324
Amdahl	8.29	1.31	34	8.76	1.07	34
Burroughs	7.30	2.11	27	6.93	2.11	28
CDC	6.83	1.66	24	7.83	1.86	24
Cray	8.10	1.45	10	9.00	0.82	10
DEC	7.47	1.83	30	7.83	1.53	30
Data General	7.38	2.01	21	7.62	2.01	21
Honeywell	7.12	1.32	33	7.61	2.08	33
IBM	7.70	1.42	53	8.19	1.27	53
NAS	7.97	1.67	29	8.33	1.73	30
Perkin Elmer	6.30	2.18	20	6.50	2.19	20
Tandem	7.20	1.40	10	7.00	2.31	10
Univac	7.65	1.56	31	7.90	1.56	31

©1983 by INPUT. Reproduction Prohibited.

EXHIBIT V-1

USER RATINGS OF HARDWARE AND SOFTWARE FIELD SERVICE ENGINEERS' COMMUNICATIONS

VENDOR	HARDWARE			SOFTWARE		
	Mean	Standard Deviation	Number of Responses	Mean	Standard Deviation	Number of Responses
All Vendors	8.05	1.50	324	6.78	2.16	281
Amdahl	8.50	1.11	34	7.89	1.48	27
Burroughs	7.75	2.12	28	6.48	2.26	27
CDC	7.79	1.59	24	6.00	2.66	18
Cray	8.90	0.88	10	8.20	0.92	10
DEC	7.90	1.40	30	5.60	2.33	20
Data General	7.95	1.60	21	6.88	2.52	17
Honeywell	8.00	1.27	33	6.56	2.08	32
IBM	8.11	1.22	53	7.12	1.86	49
NAS	8.57	1.41	30	7.52	1.83	27
Perkin Elmer	7.25	1.92	20	4.40	1.76	15
Tandem	6.90	1.91	10	8.00	1.22	9
Univac	8.29	1.32	31	6.63	2.09	30

©1983 by INPUT. Reproduction Prohibited.